

**Sources of Data and
Expertise for Environmental
Factors Relevant to
Amphibious Operations**

Colin J.F. Andrew and
P.J. Mulhearn

DSTO-GD-0256

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

20010405 005

Sources of Data and Expertise for Environmental Factors Relevant to Amphibious Operations

Colin J. F. Andrew and P.J. Mulhearn

**Maritime Operations Division
Aeronautical and Maritime Research Laboratory**

DSTO-GD-0256

ABSTRACT

In the planning and conduct of amphibious operations it is necessary to have knowledge of a range of environmental variables, such as sea states, surf zone width and wave heights, beach composition, and bathymetry. Before embarking on a research program it seemed worthwhile to survey the institutions and personnel who already have expertise in the gathering and analysis of relevant environmental data types for Australian waters, and in their modelling and forecasting. The findings are presented here. The institutions which have data holdings are also reviewed and a considerable bibliography of papers, reports and books is presented. The primary purpose of this report is to be a reference document, both for DSTO and for interested ADF personnel.

RELEASE LIMITATION

Approved for public release

DEPARTMENT OF DEFENCE
DEFENCE SCIENCE & TECHNOLOGY ORGANISATION

DSTO

AQ F01-06-1132

Published by

*DSTO Aeronautical and Maritime Research Laboratory
PO Box 4331
Melbourne Victoria 3001 Australia*

*Telephone: (03) 9626 7000
Fax: (03) 9626 7999
© Commonwealth of Australia 2000
AR-011-611
July 2000*

APPROVED FOR PUBLIC RELEASE

Sources of Data and Expertise for Environmental Factors Relevant to Amphibious Operations

Executive Summary

The planning and conduct of amphibious operations requires knowledge of a range of environmental variables, such as:

- Surface wave characteristics;
- Large scale currents;
- Nearshore currents (which includes those generated by waves, wind and tides);
- Bathymetry;
- Beach morphology data;
- Nearshore sediment types;
- Distributions of marine growth;
- Water turbidity.

A considerable range of data and expertise exists within Australia on the environmental variables which are relevant to amphibious operations. There are data gatherers and analysers, data archivers, builders of mathematical models and forecasters. In this report a survey is presented of the personnel and institutions with relevant expertise so as to provide a reference document, both for DSTO and for interested ADF personnel.

Contents

1. INTRODUCTION	1
2. SURFACE WAVE CHARACTERISTICS.....	1
3. LARGE SCALE CURRENTS	2
3.1 People	3
3.2 Institutions	3
3.3 Tidal Current Modelling	4
4. NEARSHORE CURRENTS	4
5. BATHYMETRY	4
5.1 People	4
5.2 Data Sources.....	4
5.3 Coastline Data Sets	5
6. BEACH MORPHOLOGY.....	5
6.1 People	5
6.2 Data Sources.....	5
7. NEARSHORE SEDIMENT DATA.....	6
7.1 People	6
7.2 Data Sources.....	6
8. DISTRIBUTIONS OF MARINE GROWTH	7
8.1 Seagrass Communities.....	7
8.1.1 People	7
8.1.2 Data Sources.....	8
8.2 Mangroves	8
8.2.1 People	8
8.2.2 Data Sources.....	8
9. WATER TURBIDITY AND SEDIMENT TRANSPORT.....	8
9.1 People	9
9.2 Data Sources.....	9
10. DATASETS WHICH SPAN SEVERAL DATA TYPES	9
11. REFERENCES	10
12. BIBLIOGRAPHY	11
12.1 Surface Waves.....	11
12.2 Large Scale Currents.....	12
12.3 Nearshore Currents.....	12
12.4 Bathymetry	13

12.5	Beach morphology	13
12.6	Nearshore Sediment Data	14
12.7	Distributions of Marine Growth.....	17
12.7.1	Seagrass Communities.....	17
12.7.2	Mangroves	19
12.8	Water Turbidity and Sediment Transport.....	21
12.9	References covering a number of fields	22
12.9.1	Books	22
12.9.2	Reports	22

1. Introduction

For amphibious operations, as is common with all military operations, knowing what environmental conditions to expect prior to an operation can literally be the difference between success and failure. Environmental data is needed in two main ways. One is to provide a data base of both those factors which vary very little over time, such as seabed composition, and those which vary significantly with time, such as sea states, so as to determine the likely range of conditions to be expected during a planned operation. The other requirement is for data immediately before or even during an operation.

The marine data types seen as being relevant to amphibious operations include:

- Surface wave characteristics (which includes offshore and nearshore)
- Large scale currents
- Nearshore currents (which includes those generated by waves, wind and tides)
- Bathymetry
- Beach morphology data
- Nearshore sediment types
- Distributions of marine growth
- Turbidity

This report will outline the personnel in Australia with expertise in the acquisition and analysis of each of these data types, as well as those with expertise in their mathematical modelling. The institutions with holdings of each data type, especially for northern Australia, will also be listed. The bibliography (Section 12) contains a list of references. While the authors have attempted to be as thorough as possible it cannot be claimed that this report is totally exhaustive. In any active scientific field new initiatives are arising all the time and particular individuals or institutions may have been overlooked unintentionally. However the authors believe that this report covers most of the relevant personnel and institutions. A complementary report on sources of environmental data relevant to mine warfare is Mulhearn (1999).

2. Surface Wave Characteristics

Companies and organisations with expertise in obtaining or analysing surface wave data have already been listed in Hamilton (1997). He also reviewed and listed data holdings on waves, for the Australian area. His treatment will not be repeated here. Wave models have been reviewed in Andrew (1999). People who have expertise in obtaining and analysing surface wave data or mathematical modelling of waves include:

Associate Professor Michael Banner, University of NSW, (wind wave generation)
Dr E.S. Benilov, University of NSW, (non-linear waves and wave scattering)

Dr Peter Blennerhassett, University of NSW, (surface wave generation)
Dr Richard Brinkman, Australian Institute of Marine Science, Townsville
Douglas Bruce, Coastal Environment Pty Ltd
Steve Buchan, Weather News International
Dr Derek Burrage, Australian Institute of Marine Science, Townsville
Ms Diana Greenslade, Bureau of Meteorology Research Centre, Melbourne (wave modelling)
Professor Cedric Griffiths, Department of Petroleum, University of Adelaide
Ms Debbie Cox, University of NSW (surface wave modelling)
Dr Roger Grimshaw, Monash University, Clayton, Victoria
Dr Thomas Hardy, James Cook University, Townsville
Bruce Harper, System Engineering Australia
Professor Mal Heron, James Cook University, Townsville (HF Radar)
Dr John Hsu, University of Western Australia (waves)
Dr Michael Hughes, Department of Geology & Geophysics, University of Sydney, (wave modelling)
Richard Lailey, Weather News International
Mr Jason McConochie, James Cook University, Townsville
Dr Brendan T McGann, Curtin University
Dr W.D. McKee, University of NSW (current and wave interactions)
Mr Lou Mason, James Cook University, Townsville
Mr Brett Miller, University of NSW (surface wave modelling)
Mr R.C.Nelson, University of NSW (wave shoaling and breaking)
Dr Brian Noye, University of Adelaide (waves)
Dr Charitha Pattiaratchi, University of Western Australia (waves)
Arthur Shrimpton, Weather News International
Dr Bill Peirson, University of NSW (surface wave generation)
Dr Graham Warren, Oceanographic Systems Development, Bureau of Meteorology, Melbourne (wave modelling)
Dr A.T.Webb, Australian Defence Forces Academy (surface wave climatology)
Professor Ian Young, University of Adelaide, (wave modelling)

For institutions holding data see Hamilton (1997).

3. Large Scale Currents

Horizontal currents in the ocean are normally measured by:

1. Aanderaa (rotary) current meters,
2. Acoustic Doppler Current Profilers (ADCP's) (either ship, mooring or bottom mounted)
3. Lagrangian Neutrally Buoyant floats, or
4. Electromagnetic current meters

3.1 People

People who have expertise in obtaining and analysing current data or in modelling currents include:

Dr John Bennet, Flinders University, Adelaide
 Dr Derek Burrage, Australian Institute of Marine Science, Townsville
 Dr John Bye, Flinders University, Adelaide
 Dr Michael Coates, Deakin University (laboratory oceanographic modelling)
 Dr Peter Craig, CSIRO Division of Marine Research, Hobart
 Dr George Cresswell, CSIRO Division of Marine Research, Hobart
 Dr R.S. Gardiner-Garden, University of NSW (Leeuwin Current)
 Professor Roger Grimshaw, Monash University
 Dr Clifford Hearn, Australian Defence Force Academy
 Dr Peter Holloway, Australian Defence Force Academy
 Professor Jason Middleton, University of NSW
 Dr John Middleton, University of NSW
 Dr Rick Nunes Vaz, Australian Defence Force Academy
 Dr Charitha Pattiaratchi, University of WA
 Mr Alan Pearce, CSIRO Division of Marine Research, W.A.
 Dr Steve Rintoul, CSIRO Division of Marine Research, Hobart
 Dr Brian Sanderson, University of NSW
 Dr Neville Smith, Bureau of Meteorology
 Professor Matthias Tomczak, Flinders University, Adelaide
 Stephen Walker, CSIRO Division of Marine Research, Hobart
 Dr Susan Wijffels, CSIRO Division of Marine Research, Hobart

3.2 Institutions

Data on currents are held by the following institutions:

The Australian Defence Force Academy for the Northwest Shelf of Australia, (Contact: Dr Peter Holloway);

The Australian Institute of Marine Science for the Great Barrier Reef, Torres Strait, Exmouth Gulf and elsewhere;

Weather News International for numerous locations, including Bass Strait, and the approaches to Dampier and Port Headland;

Woodside Petroleum for Mermaid Sound and the approaches to Dampier;

CSIRO for the whole of Australia's coastal fringes as well as offshore extremities;

Australian Oceanographic Data Centre (AODC);

The RAN Hydrographer for tidal stream data from many ports.

3.3 Tidal Current Modelling

Individuals with expertise in the modelling of tidal currents include:

Dr Lance Bode and Dr Luciano Mason, Department of Civil & Systems Engineering,
James Cook University, Townsville;
Dr John Middleton, School of Mathematics, University of New South Wales;

A number of other institutions have expertise in modelling tidal currents including:

Centre for Water Research, University of Western Australia;
Australian Institute of Marine Science, Townsville;
National Tidal Facility, Adelaide.

4. Nearshore Currents

Here the term nearshore currents includes both long-shore currents and rips. People who have expertise in measuring and calculating nearshore velocities include:

Dr Michael Hughes, University of Sydney
Mr Lex Nielsen, University of NSW, Sydney
Dr Peter Nielsen, University of Queensland
Dr Graham Symonds, Australian Defence Force Academy, Canberra
Dr Ian Turner, University of NSW, Sydney

Note that the areas of nearshore currents, beach morphology and sediment transport are closely related, so that expertise in one really implies expertise in the other two.

5. Bathymetry

5.1 People

The main agency for bathymetric data around Australia is the RAN Hydrographic Office in Wollongong. Other people or agencies having expertise in the coastal bathymetry of Australia include:

George Bernadell, Australian Geological Survey Organisation, Canberra
Cameron Buchanan, Australian Geological Survey Organisation, Canberra
The LADS Corporation, for laser airborne depth sounding.

5.2 Data Sources

Sources of digital bathymetric data for the Australian region include:

Digital Bathymetry Data Base 5 minutes (DBDB5), downloadable from the worldwide-web;
 Earth Topography#5, downloadable from the worldwide-web;
 GEBCO-97, a CD from the British Oceanographic Data Centre;
 The RAN Hydrographer;
 30 second bathymetry maps of the Australian region from the Australian Geological Survey Organisation.

5.3 Coastline Data Sets

Organisations with expertise in coastline data sets include the RAN Hydrographer and the Australian Land Information Group (AUSLIG), Department of Industry, Science and Resources. The different data sets that can be used to depict the Australian coastline include:

World Data Bank II (or the CIA Data Bank) 1:2,000,000
 World Vector Shoreline 1:250,000
 World Coast Line 1:5,000,000
 GSHHS (Global Self-consistent Hierarchical High resolution Shoreline database)
 GEODATA COAST (from AUSLIG) 1:100,000
 GEBCO-97
 Global Relief Data (from the NOAA National Data Centre)

6. Beach Morphology

6.1 People

People with expertise in measuring and analysing nearshore morphology include:

Dr Peter Cowell, University of Sydney
 Dr Gerhard Masselink, University of Western Australia
 Professor Andy Short, University of Sydney

Note that the areas of nearshore currents, beach morphology and sediment transport are closely related, so that expertise in one really implies expertise in the other two.

6.2 Data Sources

James Cook University has some aerial photographs which could be used to infer morphology, as does Professor Andy Short and AUSLIG.

Professor Short has set up the Australian Beach Safety and Management Program Database which, when complete, will cover all Australian beaches. It contains a wealth of information on the morphology of individual beaches (Web page: <http://www.slsa.asn.au/web/slsa/slsaweb.nsf/SectionPage/Beach+Safety+and+Management>). Short (1993, 1996 and 2000) reports on surveys of the NSW, Victorian and eastern Queensland coasts, respectively.

7. Nearshore Sediment Data

7.1 People

Personnel who have expertise in obtaining and analysing sediment data include:

Ray Brown, University of WA
 Dr G Brunskill, Australian Institute of Marine Science
 John Chappell, Australian National University
 Professor Allan Chivas, University of Wollongong
 Associate Professor M. Fahey, University of WA
 Dr Peter Harris, Antarctic CRC, Hobart, Tasmania
 Dr Chris Jenkins, Ocean Sciences Institute, Sydney University
 Brian Logan, Alness Street, Applecross, WA 6153
 Dr Bradley Opdyke, Australian National University
 Peter Roy, Department of Geography, University of Sydney
 Dr Victor Semeniuk, Journal of the Royal Society of Western Australia and private consulting firm in Perth [vcsrg@iinet.net.au]
 Professor Andrew Short, Coastal Studies Unit, University of Sydney (expertise on beach forms)
 Professor Chris Von Der Borsch (retired), School of Earth Science, Flinders University, Adelaide
 Associate Professor Colin Woodroffe, University of Wollongong (particular expertise for northern Australian coastal waters)

7.2 Data Sources

Professor Andrew (Andy) Short is collecting sediment data for the swash and surf zone around the northern Australian coastline for Surf Lifesaving Australia and for DSTO. Professor Short has set up the Australian Beach Safety and Management Program Database which, when complete, will cover all Australian beaches. (Web page: <http://www.slsa.asn.au/web/slsa/slsaweb.nsf/SectionPage/Beach+Safety+and+Management>). Short (1993, 1996 and 2000) report on the surveys of the NSW, Victorian and eastern Queensland coasts, respectively.

The Australian Geological Survey Organisation (AGSO) has some sediment data for the northern Australian coastal zone, and the Australian Defence Forces has a Beachcomber data base. The Australian Institute of Marine Science holds sediment data for Exmouth Gulf, W.A. and has taken video transects of the bottom both within the Great Barrier Reef and off northwestern Australia. These could be very useful.

Galloway et al. (1984) outlines sediment data between the mid and high water marks derived from air photos. It also has data regarding vegetation distributions. An excellent review of sediment data for the Australian continental shelf is Harris et al. (1991). It has, however, little information on beaches.

The CSIRO Coastal and Marine Resources Information System (CAMRIS) Coastal Soils Data set has soil or sediment information in the coastal zone and was derived from the Atlas of Australian Soils (Northcote et al, 1960-68). The CAMRIS Australian Estuaries Data set contains information about the distribution and characterisation of estuaries around the Australian coastline. It was derived from the inventory of Australian estuaries prepared by Bucher and Saenger (1989).

The Ocean Sciences Institute Australian Seabed Database (AUSEABED), although not a coastal sediment data base, does have limited data shoreward of the 10m mark. The Australian Oceanographic Data Centre (AODC) holds a copy of this database.

CSIRO Division of Marine Research has some satellite data which may be useful for inferring nearshore sediment data. AGSO has developed some algorithms for doing this.

8. Distributions of Marine Growth

Only seagrass and mangroves are covered here. Little work has been performed on mapping distributions of macroalgae, such as kelp, in northern Australian waters.

8.1 Seagrass Communities

8.1.1 People

People with expertise in seagrass biology include:

Dr Ian Hahmdorf, Bureau of Resource Sciences

Dr Hugh Kirkman, CSIRO Division of Marine Research

Dr David W Klumpp, Australian Institute of Marine Science (d.klumpp@aims.gov.au)

Dr A.W.D. Larkum, University of Sydney (alark@bio.usyd.edu.au)

Brian Long (CSIRO Division of Marine Research, Cleveland, Queensland)

Dr Laurence McCook, Australian Institute of Marine Science

Dr Eric Paling, Murdoch University(paling@essun1.murdoch.edu.au)
Dr Roland Pitcher (CSIRO Division of Marine Research, Cleveland, Queensland
Dr Peter Rothlisberg (CSIRO Division of Marine Research, Cleveland, Queensland
Dr Scoresby Shepherd, South Australian Research and Development Industry
Thomas Taranto, CSIRO Division of Marine Research, Cleveland, Queensland
Dr Mike van Keulen, Murdoch University

8.1.2 Data Sources

CAMRIS Seagrass Dataset contains information about seagrass distributions around Australia's coastline. Other information can be found from the publications in the Reference Section.

8.2 Mangroves

8.2.1 People

Personnel that have expertise in mangrove distributions around the Australian coastline include:

Catherine Lovelock, Australian Institute of Marine Science
Keith McGuiness, Northern Territory University
Darren Wilson, BHP

8.2.2 Data Sources

Australian Institute of Marine Science has data concerning mangrove distributions along the coast of northwestern Australia. The Australian Environmental Resources Information Network (ERIN) has distribution maps for mangroves (web address: <http://www.environment.gov.au>).

The Northern Territory Department of Lands, Planning and Environment is currently planning studies to map mangrove distributions around the Northern Territory.

9. Water Turbidity and Sediment Transport

Water turbidity is controlled by three factors: dissolved organic compounds; particles in suspension; living organisms of which the dominant ones are single celled algae or phytoplankton. In the nearshore region suspended particles are often the dominant source of water turbidity and calculation of their concentrations requires a knowledge of suspended sediment transport processes.

9.1 People

People who have expertise in measuring and calculating longshore sediment transport magnitudes include:

Dr Michael Hughes, University of Sydney
Dr Peter Nielsen, University of Queensland
Dr Charitha Pattiaratchi, University of Western Australia
Dr Peter Ridd, James Cook University
Dr David Walker, University of Adelaide

Note that the areas of nearshore currents, beach morphology and sediment transport are closely related, so that expertise in one really implies expertise in the other two.

9.2 Data Sources

The Australian Institute of Marine Science (AIMS) has water quality and suspended sediment concentration data in the vicinity of some reefs in the Great Barrier Reef and off Australia's northwest coastline. This was taken from 1990 to 1996 inclusive. AIMS also has turbidity data derived from NOAA satellites.

The Australian Oceanographic Data Centre has turbidity data for Australian waters, mostly as Secchi disc data. CSIRO Division of Marine Research, Hobart, also holds turbidity data. Most of the data held by these two organisations is not from locations close inshore.

CSIRO Division of Marine Research has a satellite data receiving system and some satellite data can be used for obtaining water turbidity data. An example of the methods which can be used is reported in Mulhearn (1995).

10. Datasets which Span Several Data Types

The Australian Spatial Data Directory seems to be able to extract many types of data (most importantly oceanographical) from numerous sources. It is located at (<http://www.environment.gov.au/net/asdd/>) and appears to have huge potential.

The National Geographic Information System (<http://www.ngis.com.au/index.htm>) has compiled many environmental data bases for the petroleum industry and may be consulted to determine which could be useful.

The Australian Coastal Atlas (http://www.environment.gov.au/marine/coastal_atlas/) is also a valuable source of coastal information, including data on beaches, vegetation, topography and infrastructure.

TOPO250K is a dataset which shows the following attributes about Australia: coastline; land usage; drainage networks; roads; railways; lakes; wetlands; relief.

TOPO101 is a dataset for Western Australia and shows coastlines and geomorphological type for the coastlines. The geomorphology data was captured from the Howard Jones dataset (Marine resources map of Western Australia) and were later verified by Ian Elliot (University of Western Australia). The coastline data came from the AUSLIG 1:100,000 coastline database.

The CAMRIS database has coastal wind data, coastal wave-rider buoy locations, Exclusive Economic Zone (EEZ) bathymetry, and tidal data.

11. References

Andrew, C.J.F., 1999, *Bibliographic Review of Nearshore Wave Models*, DSTO General Document, DSTO-GD-0214.

Bucher, D. and Saenger, P., 1989, *An inventory of Australian Estuaries and enclosed marine waters*. Prepared for the Australian recreational and sports fishing federation and the Australian national parks and wildlife service. Centre for coastal management, Lismore. 7 volumes, summary report and database.,

Galloway, R.W., Story, R., Cooper, R. and Yapp, G.A., 1984, *The Coastal Land of Australia*, Natural Resources Series No. 1, Division of Water and Land Resources, CSIRO.

Harris, P.T., Baker, E.K. and Cole, A.R., 1991, *Physical Sedimentology of the Australian Continental Shelf*, Ocean Sciences Institute Report No. 51, University of Sydney.

Hamilton, L.J., 1997, *Bibliography of Wind-Wave Data and Publications for the Coastal Regions of Australia*. DSTO-General Document-0116.

Mulhearn, P.J., 1995, Landsat Reflectivities versus Secchi Disc Depths. *International Journal of Remote Sensing*, 16, (2), 257 - 268.

Mulhearn, P.J., 1999, *Sources of Environmental Data for Mine Warfare*, DSTO General Document, DSTO-GD-0207.

Northcote, K.H. with Beckmann G.G., Bettenay E., Churchward H.M., van Dijk D.C., Dimmock G.M., Hubble G.D., Isbell R.F., McArthur W.M., Murtha G.G., Nicolls K.D., Paton T.R., Thompson C.H., Webb A.A. and Wright M.J., 1960-68, *Atlas of Australian Soils, Sheets 1 to 10, with explanatory data*. CSIRO and Melbourne University Press, Melbourne.

Short, A.D., 1993, *Beaches Of The New South Wales Coast*, Australian Beach Safety and Management Project, Sydney.

Short, A.D., 1995, *Beaches of the Victorian Coast*, Australian Beach Safety and Management Project, Sydney.

Short, A.D., 2000, *Beaches of the Queensland Coast: Cooktown to Coolangatta : A guide to their nature, characteristics, surf and safety*, Surf Lifesaving Australia, 360 pp.

12. Bibliography

12.1 Surface Waves

Andrew, C.J.F., 1999, *Bibliographic Review of Nearshore Wave Models*, DSTO General Document, DSTO-GD-0214.

Burrage, D.M., Massel, S.R., Steinberg, C. and Skirving, W., 1996, *Detecting surface and internal wave signatures on the northwest Australian Shelf using the ERS 1 & 2 Active Microwave Instrumentation (AMI)*. In Kingwell, J. (ed), *Proceedings of the First Australian ERS Symposium*, University of Tasmania, Hobart, 6th February 1996. CSIRO Office of Space Science and Applications, Earth Observation Centre, Canberra, 11-26.

Hamilton, L.J., 1997, *Bibliography of Wind-Wave Data and Publications for the Coastal Regions of Australia*. DSTO General Document, DSTO-GD-0116.

Massel, S.R., Brinkman, R.M., Mason, L. and Bode, L., 1997, *Water circulation and waves in Exmouth Gulf*. Poster presentation at APOC/ AMOS Conference, Sydney, Feb 10-12, 1997.

Short, A.D. and Trenaman, N.L., 1992, Wave climate of the Sydney region: an energetic and highly variable ocean wave regime, *Australian Journal of Marine & Freshwater Research*, **43**, 765-791.

12.2 Large Scale Currents

Church, J.A. and Forbes, A.M.G., 1983, Circulation in the Gulf of Carpentaria. I. Direct observations of currents in the south-eastern corner of the Gulf of Carpentaria. *Australian Journal of Marine & Freshwater Research*, **34**, 1-10

Cresswell, G.R., 1971, *Current measurements in the Gulf of Carpentaria*. CSIRO Div. Fish.Oceanogr., Rep. No. 50.

Forbes, A.M.G. and Church, J.A., 1983, Circulation in the Gulf of Carpentaria. II. Residual currents and mean sea level. *Australian Journal of Marine & Freshwater Research* **34**:11-22

Furnas, M. and Steinberg, C., 1996, *Environmental and oceanographic measurements made at Scott Reef, Mermaid Reef and Broome, Western Australia: September 1994 to October 1995*. Report to Woodside Offshore Petroleum Pty Ltd. Australian Institute of Marine Science, Townsville 185pp.

Massel, S.R., Brinkman, R.M., Mason, L. and Bode, L., 1997, *Water circulation and waves in Exmouth Gulf*. Poster presentation at APOC/AMOS Conference, Sydney, Feb 10-12, 1997.

Rothlisberg, P.C., White, N.J. and Forbes, A.M.G., 1989, *Hydrographic Atlas of the Gulf of Carpentaria*. CSIRO Marine Labs. Rep. 209.

Scott, B. (Ed), 1997, *Investigation of a proposed tracking range near Exmouth*. DSTO.

Wright, L., 1981, Nearshore tidal currents and sand transport in a macrotidal environment. *Geo-marine Letters* **1**:173-179 (this data was obtained near Broome, WA)

12.3 Nearshore Currents

Black, K.P., Rosenberg, M., Symonds, G., Simons, R., Pattiaratchi, C. and Nielsen, P., 1996, Measurements of wave, current and sea level dynamics of an exposed coastal site, in *Mixing in Estuaries and Coastal Seas*, Coastal and Estuarine Studies, C. Pattiaratchi (ed.), 32-59.

Brander, R.W., Short, A.D., Osborne, P.D., Hughes, M.G. and Mitchell, D.M., 1999, Field measurements of a large-scale rip current system. In: N.C. Kraus and W.G. McDougal (Editors), *Coastal Sediments 99*, ASCE. New York, 562-575.

Huntley, D.A. and Short, A.D., 1992, On the spacing between observed rip currents, *Coastal Engineering*, **17**, 211-225.

Symonds, G., Holman, R.A. and Bruno, B., 1998, Rip Currents, in *Coastal Dynamics '97*, University of Plymouth, Plymouth, U.K., 23-27 June, ASCE, New York.

Symonds, G., Holman, R.A. and Bruno, B., 1998, Rip Currents, in Coastal Dynamics '97, University of Plymouth, Plymouth, U.K., 23-27 June, ASCE, New York.

Wright, L.D., 1981, Nearshore tidal currents and sand transport in a macrotidal environment. *Geo-Marine Letters*, 1. 173-179.

12.4 Bathymetry

Amos, T. T. and Alfoldi, C. L., 1979, The determination of suspended sediment concentration in a macrotidal system using Landsat data. *Journal of Sedimentary Petrology*, 49 (1): 159-174. (can also be used to infer bathymetry)

Bierthwirth, P.N., Lee, T.J. and Burne, R.V., 1992, Shallow water mapping via the separation of depth and substrate components from multispectrum data: an example from Useless Inlet, Shark Bay, Western Australia. *Proceedings of the Sixth Australian Remote Sensing Conference, Wellington, New Zealand*. 1: 99-109.

Curran, P.J. and Novo, E.M.M., 1988, The relationship between suspended sediment concentration and remotely sensed spectral radiance. *Journal of Coastal Research*, 4(3): 351-368.

Jupp, D.L.B., 1988, *Background and extensions to Depth of Penetration (DOP) mapping in shallow coastal waters*, in *Symposium on Remote Sensing of the Coastal Zone*. Gold Coast, Queensland, Session 4, Paper 2.

Nordman, M.E., Wood, L., Michalek, J.L. and Christy, J.L., 1990, Water depth extraction from Landsat-S imagery. *Proceedings of the Twenty-Third International Symposium on Remote Sensing of Environment*, pp. 1129-1139.

12.5 Beach morphology

Hughes, M.G., 1986. Sediment dynamics and distribution on persistently reflective beaches. *Abstracts 12th International Sedimentary Congress*, 147.

Hughes, M.G., 1989. *Morphological Changes in the Forster/Tuncurry Tidal Delta: 1988-1989*. Australian Water and Coastal Studies, Report No. 89/24, 70 pp.

Hughes, M.G. and Turner, I.L., 1999, Chapter 5 - *The Beach Face*. In: A.D. Short (Editor), *Handbook of Beach and Shoreface Morphodynamics*. John Wiley & Sons, 119-144.

Hughes, M.G. and Cowell, P.J., 1987, Adjustment of reflective beaches to waves. *Journal of Coastal Research*, 3(2), 153-167.

Huntley, D.A. and Short, A.D., 1992, On the spacing between observed rip currents, *Coastal Engineering*, **17**, 211-225.

Masselink, G. and Short, A.D., 1993, The effect of tide range on beach morphodynamics and morphology: a conceptual model, *Journal of Coastal Research*, **9**, 785-800.

Messel, H., Vorlicek, G.C. Wells, A.G. and Green, W.J., 1980, *Surveys of tidal river systems in the northern territory of Australia and their crocodile populations*. Pergamon Press. Monograph#14.

Sherman, D.G., Short, A.D. and Takeda, I., 1993, Megaripple migration and sediment mixing depth in rip channels, *Journal of Coastal Research*, **Special Issue 15**, 39-48.

Short, A.D., 1991, Meso-macro tidal beach morphodynamics: an overview, *Journal of Coastal Research*, **7**, 417-436.

Short, A.D., 1992, Beach systems of the central Netherlands coast: processes and morphology and structural impacts in a storm-driven multi-bar system, *Marine Geology*, **107**, 103-137.

Short, A.D., ed., 1993, Beach and Surf Zone Morphodynamics, *Journal of Coastal Research*, **Special Issue 15**, Coastal and Educational Research Foundation, Florida, 231 pp.

Short, A.D., 1993, *Beaches Of The New South Wales Coast*, Australian Beach Safety and Management Project, Sydney.

Short, A.D., 1995, *Beaches of the Victorian Coast*, Australian Beach Safety and Management Project, Sydney.

Short, A.D., 2000, *Beaches of the Queensland Coast: Cooktown to Coolangatta : A guide to their nature, characteristics, surf and safety*, Surf Lifesaving Australia, 360 pp.

Short, A.D. and Aagaard, T., 1993, Single and multi-bar beach model, *Journal of Coastal Research*, **Special Issue 15**, 141-157.

Short, A.D. and Hogan, C.L., 1995, Rips and beach hazards, their impact on public safety and implications for coastal management, *Journal of Coastal Research*, **12**, 197-209.

12.6 Nearshore Sediment Data

Chivas, A.R., Torgersen, T. and Polach, H.A. 1990, Growth rates and Holocene development of stromatolites from Shark Bay, Western Australia. *Aust. J. Earth Sci.*, **37**: 113-121.

Borissova, I. & Symonds, P.A. (compilers), 1997, *Australian basin form map*. Australian Geological Survey Organisation, 1:6000000.

Brown, R.G. 1988. Holocene sediments and environments, Exmouth Gulf, Western Australia. In Purcell, P.G. and R.R., editors. The North West Shelf, Australia, in Proceedings of Petroleum Exploration Society Australia Symposium, Perth, 1988. pp. 85-93.

Brown, R.G. and Woods, P.J. 1974 Sedimentation and tidal-flat development, Nilemah embayment, Shark Bay, Western Australia, American Association of Petroleum Geologists, Memoir 22, p. 316-340.

Bucher, D. and Saenger, P., 1989, An inventory of Australian Estuaries and enclosed marine waters. Prepared for the Australian recreational and sports fishing federation and the Australian national parks and wildlife service. Centre for coastal management, Lismore. 7 volumes, summary report and database.,

Galloway, R.W., Story, R., Cooper, R. and Yapp, G.A., 1984, The Coastal Land of Australia, Natural Resources Series No. 1, Division of Water and Land Resources, CSIRO.

Hamilton, N.T.M. and Cocks, K.D., 1995, A small scale spatial analysis system for maritime Australia. Ocean and Coastal Management, 27, 3, 163-195.

Harris, P.T., 1995, Marine geology and sedimentology of the Australian continental shelf. Zann, L. and Pailola, C. (eds.) Ocean Rescue 2000: State of the Marine Environment Report, for Australia, Technical Annex 1: The Marine Environment, Australian Government Printing Office, Canberra, pp. 11-23.

Harris, P.T., Baker, E.K. and Cole, A.R., 1991, Physical Sedimentology of the Australian Continental Shelf, Ocean Sciences Institute Report No. 51, University of Sydney.

Jones, H.A., 1973 Marine geology of the Northwest Australian continental shelf. Department of Minerals and Energy, Bureau of Mineral Resources, Geology, and Geophysics, Canberra, Bulletin 136, 102 p.

Jongsma, D. 1974, *Marine Geology of the Arafura Sea*. Department of Minerals and Energy, Bureau of Mineral Resources, Geology, and Geophysics, Canberra, Bulletin 157, 73 p.

Logan, B.W., Brown, R.G., and Quilty, P.G., 1976. *Carbonate sediments of the west coast of Western Australia*. 25th International Geological Congress Excursion Guide 37A. 98 p.

Logan, B.W. and Brown, R.G., 1986, *Sediments of Shark Bay and MacLeod Basin*, Western Australia. Field Seminar Handbook, Geology Department, The University of Western Australia. 229 p.

Logan, B.W., and Cebulski, D.E., 1970, *Sedimentary environments of Shark Bay, Western Australia*. American Association of Petroleum Geologists Memoir 13, 1-37.

Logan, B.W., Read, J.F., Hagan, G.M., Hoffman, P., Brown, R.G., Woods, P.J., and Gebelein, C.D., 1974, *Evolution and diagenesis of Quaternary carbonate sequences, Shark Bay, Western Australia*. American Association of Petroleum Geologists Memoir 22, 1-358.

Northcote, K.H. with Beckmann G.G, Bettenay E., Churchward H.M., van Dijk D.C., Dimmock G.M., Hubble G.D., Isbell R.F., McArthur W.M., Murtha G.G., Nicolls K.D., Paton T.R., Thompson C.H., Webb A.A. and Wright M.J., 1960-68, *Atlas of Australian Soils, Sheets 1 to 10, with explanatory data*. CSIRO and Melbourne University Press, Melbourne.

Purcell, P.G., and Purcell, R.R. eds. *The Northwest Shelf Australia*, Proceedings of the Northwest Shelf Symposium, Perth, W.A., Petroleum Exploration Society of Australia, pp. 85-93.

Scott, B. (Ed), 1997, *Investigation of a proposed tracking range near Exmouth*. DSTO.

Semeniuk, V. 1993, The Pilbara Coast: a riverine coastal plain in a tropical arid setting, northwestern Australia. *Sedimentary Geology*, 83, 235-256.

Semeniuk, V., Chalmer, P.N. and Le Provost, I., 1982, The marine environments of the Dampier Archipelago, *Journal of the Royal Society of Western Australia*, 65 (3), 97-114.

Short, A.D., 1993, *Beaches of the New South Wales Coast: A guide to their nature, characteristics, surf and safety*, Surf Lifesaving Australia, 358 pp.

Short, A. D., 1996, *Beaches of the Victorian Coast and Port Phillip Bay: A guide to their nature, characteristics, surf and safety*, Surf Lifesaving Australia, 298 pp.

Short, A. D., 2000, *Beaches of the Queensland Coast: Cooktown to Coolangatta : A guide to their nature, characteristics, surf and safety*, Surf Lifesaving Australia, 360 pp.

Semeniuk, V., Chalmer, P.N., Provost, I. , 1982, The marine environments of the Dampier Archipelago. *Journal of the Royal Society of Western Australia*, 65, (3), 97-114.

Woodroffe, C.D. (Ed), 1993, Late Quaternary evolution of coastal and lowland Riverine plains of Southeast Asia and northern Australia, Special Issue of *Sedimentary Geology*, 83.

Woodroffe, C.D., Chappell, J., Thom, B.G., & Wallensky, E., 1989, Depositional model of a macrotidal estuary and floodplain. South Alligator River, Northern Australia. *Sedimentology* 36, 737-756.

12.7 Distributions of Marine Growth

12.7.1 Seagrass Communities

Aston, H.I., 1973, *Aquatic Plants of Australia*, Melbourne University Press, Melbourne.

Borowitzka, M.A. and Lethbridge, R.C., 1989, *Seagrass epiphytes*. In: *Biology of Seagrasses. A treatise on the biology of seagrasses with special reference to the Australian region*, (Eds. A.W.D. Larkum, A.J. McComb, S.A. Shepherd) (Aquatic Plant Studies 2), Elsevier, Amsterdam, p. 458-499.

Coles, R.G., Lee Long, W.J., Squire, B.A., Squire, L.C. and Bibby, J.M., 1987, Distribution of Seagrasses and Associated Juvenile Commercial Penaeid Prawns in North-eastern Queensland Waters, *Australian Journal of Marine & Freshwater Research*, **38**, 103-119.

Coles, R.G., Lee Long, W.J. and Squire, L.C., 1985, *Seagrass beds and prawn nursery grounds between Cape York and Cairns*, Queensland Department of Primary Industries Information Series No. Q185017.

Coles, R.G., Mellors, J., Bibby, J. and Squire, B., 1987, *Seagrass beds and juvenile prawn nursery grounds between Bowen and Water Park Point*, Queensland Department of Primary Industries Information Series No. Q187021.

Coles, R.G., Lee Long, W.J., Watson, R.A. and Derbyshire, K.J., 1993, Distribution of seagrasses, and their fish and penaeid prawn communities, in Cairns Harbour, a tropical estuary, northern Queensland, Australia, *Australian Journal of Marine & Freshwater Research*, **44**, 193-210.

Danaher, K., 1995, *Marine Vegetation of Cape York Peninsula*, Cape York Peninsula Land Use Strategy, Office of the Co-ordinator General of Queensland, Brisbane and Queensland Department of Primary Industries, Brisbane.

Ducker, S.C., Foord, N.J. and Knox, R.B., 1977, Biology of Australian seagrasses: the genus *Amphibolis* C. Agardh (Cymodoceaceae). *Aust. J. Bot.*, **25**, 67-95.

den Hartog, C., 1970, Seagrasses of the World. *Verh. Kon. Ned. Akad. Wetens. Afd. Naturk. Ser. 2*, **59**, 1-275 + 31 plates.

Kendrick, G.A., Waycott, M., Kirkman and H., Wyllie, A., 1997, *Two Peoples Bay seagrass study*, Unpublished study.

Kirkman, H. and Kuo, J., 1996, *Seagrasses of the southern coast of Western Australia*. In: *Seagrass Biology: Proceedings of an International Workshop*, (Eds. J. Kuo, R.C. Phillips, D.I. Walker, H. Kirkman), Faculty of Sciences, University of Western Australia, Perth, p. 51-56.

Kirkman, H. and Walker, D.I., 1989, Regional studies - Western Australian seagrass. In: *Biology of Seagrasses. A treatise on the biology of seagrasses with special reference to the Australian region*, (Eds. A.W.D. Larkum, A.J. McComb, S.A. Shepherd) (Aquatic Plant Studies 2), Elsevier, Amsterdam, p. 157-181.

Kuo, J. and Cambridge, M.L., 1984, A taxonomic study of the *Posidonia ostenfeldii* complex (Posidoniaceae) with descriptions of four new Australian seagrasses. *Aquat. Bot.* 20, 267-95.

Lanyon, J., 1986, *Guide to the Identification of Seagrasses in the Great Barrier Reef Region*, Great Barrier Reef Marine Park Authority Special Publication Series (3).

Larkum, A.W.D., McComb, A.J., and Shepherd, S.A., 1989, *Biology of Seagrasses: A treatise on the biology of seagrasses with special reference to the Australian region*. Elsevier.

Lee Long, W.J., Mellors, J.E. and Coles, R.G., 1993, Seagrasses Between Cape York and Harvey Bay, Queensland, Australia, *Australian Journal of Marine & Freshwater Research*, 44, 19-31.

Lee Long, W.J., MacKenzie, L.J. and Coles, R.G., 1997, *Seagrass Communities in the Shoalwater Bay Region, Queensland: Spring (September) 1995 and Autumn (April) 1996*. Great Barrier Reef Marine Park Authority Research Publication No. 4.

Long, B.G., T.D. Skewes, I.R. Poiner and C.R. Pitcher, 1995, *Torres Strait seagrass survey, November 1993. Final Report to the Torres Strait Scientific Advisory Committee, April 1995*, 27pp.

McCook, L.J., Klumpp, D.W. and McKinnon, A.D., 1995, Seagrass communities in Exmouth Gulf, Western Australia: a preliminary survey. *Journal of the Royal Society of Western Australia* 78, 57-63.

Munro, I.S.R., 1984, *Atlas of operational, environmental, and biological data from the Gulf of Carpentaria prawn survey, 1963-65, Part#3. Physical and chemical environment*. CSIRO Marine Laboratories Report 153.

Phillips, R.C. and Meñez, E.G., 1988, *Seagrasses*, Smithsonian Contributions to the Marine Sciences, Number 34 (Smithsonian Institution Press, Washington, D.C.).

Pitcher, C.R., Skewes, T.D., Dennis, D.M. and Prescott, J.H., 1992, Distribution of Seagrasses, Substratum Types and Epibenthic Macrobiota in Torres Strait, with Notes on Pearl Oyster Abundance, *Australian Journal of Marine & Freshwater Research*, 43, 409-419.

Pointer, I.R., Staples, D.J. and Kenyon, R., 1987, Seagrass Communities of the Gulf of Carpentaria, Australia, *Aust.J.Mar.Freshw.Res.*, 38, 121-131.

Robertson, E., 1984, *Seagrasses*. In: *The Marine Benthic Flora of Southern Australia*, (Ed. H.B.S. Womersley) (South Australian Government Printer, Adelaide). p. 57-122

Schaffelke, B. and Klumpp, D.W., 1996, *Biomass and productivity of a tropical Seagrass community in North-West Australia (Exmouth Gulf)*. In Kuo, J., Walker, D.I., Kirkman, H. and Phillips, R.C. (eds), *Seagrass Biology: Scientific Discussion from an International Workshop, Rottnest Island, Western Australia, 25-29 January 1996*. Faculty of Science, University of Western Australia, Nedlands, 13-20.

Specht, R.L. R.B.Salt, and S.T.Reynolds, 1977, Vegetation in the vicinity of Weipa, North Queensland, *Proc. Roy.Soc. Qld.* **88**, 17-38.

Stanton, J.P., 1975, *A Preliminary Assesment of Wetlands in Queensland*. Technical Memorandum 75/10, CSIRO Division of Land Use Research, Canberra.

Tomlinson, P.B., 1982, *Helobiae (Alismatidae)*, In: *Anatomy of the Monocotyledons* (Ed. C.R. Metcalfe) Vol. 7 (Clarendon Press, Oxford).

Walker, D.I., 1989, *Regional studies - seagrass in Shark Bay, the foundations of an ecosystem*. In: *Biology of Seagrasses. A treatise on the biology of seagrasses with special reference to the Australian region*. (Eds. A.W.D. Larkum, A.J. McComb, S.A. Shepherd) (Aquatic Plant Studies 2), Elsevier, Amsterdam, p.182-210

Walker, D.I., 1990, *Seagrass in Shark Bay, Western Australia*. In: *Research in Shark Bay: Report of the France-Australe Bicentenary Expedition Committee*, (Eds. P.F. Berry, S.D. Bradshaw, B.R. Wilson), Western Australian Museum, Perth, p.101-6

Walker, D.I. and Prince, R.I.T., 1987, Distribution and biogeography of seagrass species on the north-west coast of Australia. *Aquat. Bot.* **29**, 19-32

Womersely, H.B.S., 1982, Aspects of the Distribution and Biology of Australian Marine Macro-algae, In Pate, J.S. and McComb, A.J. (Eds), *The Biology of Australian Plants*, University of Western Australia, Nedlands, pp. 294-306.

12.7.2 Mangroves

Bowman, Bishaw and Gorham, Pty, 1995, Northwest Shelf Environmental Resource Atlas Report, Prepared for BHP Petroleum Pty. Ltd., Feb 1995, Report# RI4202, 88pp

Busby, J.R. and Bridgewater, P.B., 1986, A preliminary atlas of mangrove species in Australia, Australian Fauna and Flora Series#5, AGPS.

Clough, B., 1982, *Mangrove Ecosystems in Australia: structure, function and management*, ANU Press.

Dames and Moore Pty Ltd, 1981, Environmental Report on Mangrove Systems. Palmerston Area, Darwin, N.T., Job No. 12087-002-73

Hegerl, E.J., Davie, P.J.F., Claridge, G.F. and Elliot, A.G., 1979, The Kakadu National Park Mangrove Forests and Tidal Marshes Vol.1: A Review of the Literature and Results of a Field Reconnaissance, Australian Littoral Society, Report Prepared for the Australian National Parks and Wildlife Service.

Hutchings, P. and Saenger, P., 1987, Ecology of mangroves. University of Queensland Press, Brisbane.

Lear, R. and Turner, T., 1977, Mangroves of Australia. University of Queensland Press 84pp.

Lovelock, C., 1993, Field Guide to the Mangroves of Queensland, Australian Institute of Marine Science.

McGuinness, K.A. 1992, Disturbance and the mangrove forests of Darwin Harbour, In: Conservation and Development Issues in North Australia, (Ed) Moffatt, A. Webb, Australian National University Press, pp 55-62.

Robertson, A.I. and Alongi, D.M., 1992, Tropical mangrove ecosystems. AGU Press, Washington.

Semeniuk, V., 1980, Mangrove zonation along an eroding coastline in King Sound, Northwestern Australia. *J.Ecol.* **68**, 789-812

Semeniuk, V., 1983, Mangrove distribution in Northwestern Australia in relationship to regional and local freshwater seepage. *Vegetatio*. **53**, 11-31

Semeniuk, V., 1985, Development of mangrove habitats along shorelines in north and northwestern tropical Australia. *Vegetatio*. **60**, 3-23.

Semeniuk, V., 1986, Terminology for geomorphic units and habitats along the tropical coast of western Australia., *J. Roy. Soc. W.A.*, **69**, 53-79.

Semeniuk, V. and Wurm, P.A.S., 1987, The mangroves of the Dampier Archipelago, Western Australia. *J.Roy.Soc.W.A.* **69**(2),29-87.

Wightmann, G., 1989, *Mangroves of the Northern Territory*. Northern Territory Botanical Bulletin 7.

12.8 Water Turbidity and Sediment Transport

Hamilton L.J., 1994, Turbidity in the northern Great Barrier Reef lagoon in the wet season, March 1989. *Australian Journal of Marine and Freshwater Research*, **45**, 585-615.

Hughes, M.G., 1992, *Preliminary Investigation of Tidal Dynamics and Suspended Sediment Transport in the Hawkesbury River*. Water Board, Scientific Services, Report No. 92/12, 55 pp.

Hughes, M.G., 1993, *Sediment entrainment, suspension and deposition in a tidal boundary layer*, Abstracts of 23rd Estuarine and Coastal Sciences Association Symposium - Particles in Estuaries and Coastal Waters, Haren, The Netherlands, 6/1.

Hughes, M.G. and Callaghan, R.L., 1994, *Sediment Dynamics in the Hawkesbury River: With Implications for Contaminant Dispersal*. Australian Water Technologies, Science and Environment Division, Report No. 94/94, 105 pp.

Hughes, M.G. and Callaghan, R.L., 1994. *Hawkesbury-Nepean River Sediment Dynamics Study: Spatial Variability in Tidal Processes Across Selected Channel Cross-Sections Between Wisemans Ferry and Spencer*. Australian Water Technologies, Science and Environment Division, Report No. 94/85, 25 pp.

Hughes, M.G., Harris, P.T. and Hubble, T.C.T., 1998, Dynamics of the turbidity maximum zone in a micro-tidal estuary: Hawkesbury River, Australia. *Sedimentology*, **45**, 397-410.

Mulhearn, P.J., 1989, *Turbidity in Torres Strait*, Tech. Memo. No. 35/89, Maritime Systems Division, Weapons Systems Research Laboratory, DSTO, Sydney.

Mulhearn, P. J., 1993, *Distribution of Turbidity in Australian Tropical Waters*. MRL Technical Note 638, DSTO, Sydney.

Mulhearn, P. J., 1995, Landsat Reflectivities versus Secchi Disc Depths. *International Journal of Remote Sensing*, **16**, (2), 257 - 268.

Semeniuk, V., Chalmer, P.N. and Le Provost, I., 1982, The marine environments of the Dampier Archipelago, *Journal of the Royal Society of Western Australia*, **65** (3), 97-114.

Wright, L.D., 1981, Nearshore tidal currents and sand transport in a macrotidal environment. *Geo-Marine Letters* Vol 1. 173-179.

12.9 References covering a number of fields

12.9.1 Books

Australian Academy of Science, 1995, *Australian Men and Women, Science, Engineering and Technology*, Australian Academy of Science.

Fredsoe, J. and Deigaard, R., 1992, *Mechanics of Coastal Sediment Transport*, World Scientific, Singapore.

Gierloff-Emden, H.G., 1986, *Coastal Oceanography*, in Sundermann, J., *Landolt-Bornstein Numerical Data and Functional Relationships in Science and Technology, New Series, Oceanography*, vol 3, pp 191-349.

Komar, P.D., 1983, *Handbook of Coastal Processes and Erosion*, CRC Press, Boca Raton, Florida.

Nielsen, P., 1992, *Coastal Bottom Boundary Layers and Sediment Transport*, World Scientific, Singapore.

Perillo, G.M.E., (Ed.) 1996, *Geomorphology and Sedimentology of Estuaries*, Elsevier, Amsterdam.

Short, A.D. (Ed.), 1999, *Handbook of Beach and Shoreface Morphodynamics*, John Wiley & Sons, New York

Sleath, J.F.A., 1984, *Sea Bed Mechanics*, John Wiley & Sons, New York.

Soulsby, R., 1997, *Dynamics of marine sands*, Thomas Telford, London.

Wolanski, E., 1994, *Physical oceanographic processes of the Great Barrier Reef*, CRC Press, Boca Raton, Florida.

12.9.2 Reports

Bardsley, K.N., Davie, J.D.S. and Woodroffe, C.D. (Eds), 1985, *Coasts and Tidal Wetlands of the Australian Monsoon Region*, Australian National University, North Australia Research Unit, Darwin.

Bunt, J.S., 1987, *The Australian marine environment*, pp 17-42, in: *Fauna of Australia, Volume 1A, General Articles*, Canberra: Australian Government Publishing Service.

Cameron, J.M.R., 1982, *Atlas of northern Australia*, Northern Territory Department of Education.

Furnas, M. and Steinberg, C., 1996, Environmental and oceanographic measurements made at Scott Reef, Mermaid Reef and Broome, Western Australia: September 1994 to October 1995, Report to Woodside Offshore Petroleum Pty Ltd. Australian Institute of Marine Science, Townsville.

Long, B.G., Skewes, T.D., Taranto T.J., Smith G., Mcleod, I., Pitcher, C.R. and Poiner, I.R., 1997, PNG Gas Project: Torres Strait Marine Infill Survey. Report to NSR Regarding Papua New Guinea-Queensland Gas Project, CSIRO Division of Marine Research.

Mulhearn, P.J., 1999, Sources of Environmental Data for Mine Warfare, DSTO General Document, DSTO-GD-0207.

Munro, I.S.R., 1984, Atlas of operational, environmental, and biological data from the Gulf of Carpentaria prawn survey, 1963-65, Part#3. Physical and chemical environment, CSIRO Marine Laboratories Report 153.

Purcell, P.G. and R.R., (Eds), 1988, The Northwest Shelf of Australia, in Proceedings of the Petroleum Exploration Society of Australia Symposium, Perth.

Scott, B. (Ed), 1997, Investigation of a proposed tracking range near Exmouth. DSTO.
(has information regarding waves, sediments, turbidity, currents, tides).

Skewes, T.D., Pitcher, C.R., Long B.G., IMcLeod, I. and Taranto, T.J., 1996, Torres Strait Infill Survey: Report to IPC Regarding Pandora Gas Development Project, CSIRO Marine Laboratories.

Wood, T. and Bonnin, B., 1987, *Coastal Resources Atlas of the Northern Territory*. Conservation Commission, Northern Territory.

Wood, N.H. and Cocks, K.D., 1990, *Distribution of Wetlands in Australia - Current status of dataset and maps*. CSIRO Division of Wildlife and Ecology Working Document 90/2.

DSTO-GD-0256

DISTRIBUTION LIST

Sources of Data and Expertise for Environmental Factors Relevant to Amphibious Operations

Colin J.F. Andrew & P.J. Mulhearn

AUSTRALIA

DEFENCE ORGANISATION

Task Sponsor **COMAUSNAVAMPHIBASGRP**

S&T Program

Chief Defence Scientist	} shared copy
FAS Science Policy	
AS Science Corporate Management	
Director General Science Policy Development	
Counsellor Defence Science, London (Doc Data Sheet)	
Counsellor Defence Science, Washington (Doc Data Sheet)	
Scientific Adviser to MRDC Thailand (Doc Data Sheet)	
Scientific Adviser Policy and Command	
Navy Scientific Adviser	
Scientific Adviser - Army (Doc Data Sheet and distribution list only)	
Air Force Scientific Adviser	
Director Trials	

Aeronautical and Maritime Research Laboratory

Director
Chief of Maritime Operations Division
Research Leader: Dr A. Theobald
Head: Dr D.H. Cato
Task Manager : Dr P.J. Mulhearn
Authors: Mr C.J.F. Andrew and Dr P.J. Mulhearn
Dr D. Conley, MOD
Mr L.J. Hamilton, MOD
Mr J. Watson, MOD
Ms T. Keane, MOD

DSTO Library and Archives

Library Fishermans Bend (Doc Data Sheet)
Library Maribyrnong (Doc Data Sheet)
Library Salisbury (1 copy)
Australian Archives
Library, MOD, Pyrmont Library (Doc Data Sheet)
Library, MOD, HMAS Stirling
US Defense Technical Information Center, 2 copies
UK Defence Research Information Centre, 2 copies
Canada Defence Scientific Information Service, 1 copy
NZ Defence Information Centre, 1 copy

National Library of Australia, 1 copy

Capability Systems Staff

Director General Maritime Development

Director General C3I Development (Doc Data Sheet only)

Director General Aerospace Development (Doc Data Sheet only)

Navy

SO (Science), Director of Naval Warfare, Maritime Headquarters Annex,
Garden Island, NSW 2000.

Director of Oceanography and Meteorology, Garden Island, NSW, 2000.

Officer in Charge, Australian Oceanographic Centre, Garden Island, NSW, 2000.

Army

ABCA Standardisation Officer, Puckapunyal, (4 copies)

Intelligence Program

DGSTA Defence Intelligence Organisation

Manager, Information Centre, Defence Intelligence Organisation

Corporate Support Program

Library Manager, DLS-Canberra (Doc Data Sheet)

UNIVERSITIES AND COLLEGES

Australian Defence Force Academy

Library

Head of Aerospace and Mechanical Engineering

Hargrave Library, Monash University (Doc Data Sheet only)

Librarian, Flinders University

OTHER ORGANISATIONS

NASA (Canberra)

AusInfo

OUTSIDE AUSTRALIA

ABSTRACTING AND INFORMATION ORGANISATIONS

Library, Chemical Abstracts Reference Service

Engineering Societies Library, US

Materials Information, Cambridge Scientific Abstracts, US

Documents Librarian, The Center for Research Libraries, US

INFORMATION EXCHANGE AGREEMENT PARTNERS

Acquisitions Unit, Science Reference and Information Service, UK

Library - Exchange Desk, National Institute of Standards and Technology, US

SPARES (5 copies)

Total number of copies: 58

DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION DOCUMENT CONTROL DATA				1. PRIVACY MARKING/CAVEAT (OF DOCUMENT)	
2. TITLE Sources of Data and Expertise for Environmental Factors Relevant to Amphibious Operations			3. SECURITY CLASSIFICATION (FOR UNCLASSIFIED REPORTS THAT ARE LIMITED RELEASE USE (L) NEXT TO DOCUMENT CLASSIFICATION) <div style="display: flex; justify-content: space-between;"> Document U </div> <div style="display: flex; justify-content: space-between;"> Title U </div> <div style="display: flex; justify-content: space-between;"> Abstract U </div>		
4. AUTHOR(S) Colin J. F. Andrew and P.J. Mulhearn			5. CORPORATE AUTHOR Aeronautical and Maritime Research Laboratory PO Box 4331 Melbourne Vic 3001 Australia		
6a. DSTO NUMBER DSTO-GD-0256		6b. AR NUMBER AR-011-611		6c. TYPE OF REPORT General Document	
7. DOCUMENT DATE July 2000					
8. FILE NUMBER 490-6-64-1		9. TASK NUMBER NAV 98/025		10. TASK SPONSOR COMAUSNAVAMPHI BASGRP	
				11. NO. OF PAGES 24	
				12. NO. OF REFERENCES 147	
13. URL ON THE WORLD WIDE WEB http://www.dsto.defence.gov.au/corporate/reports/DSTO-GD-0256.pdf				14. RELEASE AUTHORITY Chief, Maritime Operations Division	
15. SECONDARY RELEASE STATEMENT OF THIS DOCUMENT <p style="text-align: center;"><i>Approved for public release</i></p>					
OVERSEAS ENQUIRIES OUTSIDE STATED LIMITATIONS SHOULD BE REFERRED THROUGH DOCUMENT EXCHANGE, PO BOX 1500, SALISBURY, SA 5108					
16. DELIBERATE ANNOUNCEMENT No Limitations					
17. CASUAL ANNOUNCEMENT Yes					
18. DEFTEST DESCRIPTORS Bibliography, datasets, review, littoral zone, near-shore marine environment, amphibious operations, beaches, surf, waves, currents, turbidity					
19. ABSTRACT In the planning and conduct of amphibious operations it is necessary to have knowledge of a range of environmental variables, such as sea states, surf zone width and wave heights, beach composition, and bathymetry. Before embarking on a research program it seemed worthwhile to survey the institutions and personnel who already have expertise in the gathering and analysis of relevant environmental data types for Australian waters, and in their modelling and forecasting. The findings are presented here. The institutions which have data holdings are also reviewed and a considerable bibliography of papers, reports and books is presented. The primary purpose of this report is to be a reference document, both for DSTO and for interested ADF personnel.					